

THE TACHYTES PEPTICUS GROUP IN NORTH AMERICA

(Hymenoptera: Sphecidae)

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Since Nathan Banks' revisional paper in 1942 ("Notes on the United States species of *Tachytes*", Bull. Mus. Comp. Zool. Harvard 89:395-436), little has been published on the systematics of these interesting Larrine wasps. The *pepticus* group dates from 1837 when Thomas Say described its namesake from Indiana. The principal distinguishing feature of the group is the broadening in the male of one or more of the last five flagellar segments or flagellomeres. Other characters are the essential absence of outstanding hair ventrally on the hind femur, moderately long spines on the female hind tibia, abdominal tergite IV with a distal band of bright pubescence, male fore coxa simple, and male flagellomere I at least as long as II. Furthermore, most of the members have the basal two or three abdominal segments red, a character occurring in several other groups, also. Antennal and genitalic structure of the males are practically diagnostic. The females are difficult to distinguish, however, and correct association with males is sometimes problematical. This difficulty led Banks and other workers into a number of errors, and created a certain amount of synonymy. A useful feature shared by both sexes is the distribution of bright appressed pubescence anteromedially on the scutum. Its bright reflection is best seen from above and slightly to the front.

Holotypes will be deposited in the California Academy of Sciences, San Francisco. Paratypes will be distributed to other museums insofar as possible.

Symbols used for type repositories of previously described species are: MCZ, Museum of Comparative Zoology, Harvard; ANSP, Academy of Natural Sciences, Philadelphia; AMNH, American Museum of Natural History.

KEY TO MALES OF THE TACHYTES PEPTICUS
GROUP IN NORTH AMERICA

1. Abdominal segments with dark ground color..... 2
Abdominal segments I-II or I-III extensively red..... 5
2. Flagellomeres VIII-IX but not VII broadened, IX and tip of VIII sharply edged; clypeus completely punctate above lip; anteromedian scutal depression with bright appressed pubescence as distinct, though

- not always so dense, as pretegular patch; gonostyle slender, volsella with subbasal pilose prominence 3
- Flagellomere VII broadened and sharply edged; clypeus somewhat shiny above lip; volsella without subbasal prominence..... 4
3. Occupying the Indiana-Illinois area, associated with red-marked females*pepticus pepticus* Say
Occupying southern and midwestern U. S., associated with females with all dark ground color.....*pepticus sericatus* Cresson
4. Anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as pretegular patch; flagellomere IX usually broader than VIII and sharply edged; gonostyle moderately broad, ventral tuft not extending basad to lateral edge of gonobase.....*fulviventrtris rossi* R. Bohart
Anteromedian scutal depression without bright appressed pubescence; flagellomere IX usually not so broad as VIII nor sharply edged; gonostyle moderately slender, ventral tuft extending basad to lateral edge of gonobase*pennsylvanicus* Banks
5. Flagellomeres VII-IX slightly broadened, X-XI not so; tergites I-III customarily red 6
Flagellomeres VII, VIII or IX conspicuously broadened, or with X-XI broadened; tergites I-II and sometimes extreme base of III red..... 7
6. Flagellomeres VIII-IX sharply edged; anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as pretegular patch; gonostyle moderately broad, ventral tuft without special long spines.....*sculleni* R. Bohart
Flagellomeres VIII-IX not sharply edged; anteromedian scutal depression without bright appressed pubescence; gonostyle slender, ventral tuft with one or more long curved spines distally.....*nevadensis* R. Bohart
7. Flagellomeres X-XI broadened, X not narrower than VIII; gonostyle slender 8
Flagellomere X distinctly narrower than VIII, gonostyle rather broad.. 9
8. Flagellomere XI about two-thirds as broad as long; ventral tuft of gonobase continuous*spatulatus* Fox
Flagellomere XI about one-half as broad as long; ventral tuft of gonobase divided into a basal group of dark bristles attached to edge of gonobase, and a group of reddish setae near base of gonostyle*basirufus* Rohwer
9. Anteromedian scutal depression without bright appressed pubescence; flagellomeres VII-IX broadened and sharply edged; gonostyle very broad*californicus* R. Bohart
Anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as pretegular patch; gonostyle moderately broad10
10. Flagellomeres VII-IX broadened and sharply edged; clypeus shiny above lip*fulviventrtris fulviventrtris* Cresson
Flagellomeres VIII-IX broadened, IX and apex of VIII sharply edged; clypeus punctate above lip.....*pepticus chelatus* R. Bohart

KEY TO FEMALES OF TACHYTES PEPTICUS
GROUP IN NORTH AMERICA

1. Pygidium with dull, dark coppery reflection; anteromedian scutal depression without bright appressed pubescence comparable with that of pretegular patch 2
Pygidium with coppery to nearly silvery reflection; anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as that of pretegular patch..... 4
2. Ground color of abdomen all dark.....*pennsylvanicus* Banks
Ground color of abdominal segments I-III extensively red..... 3
3. Appressed pubescence of scutum silvery or whitish.....*nevadensis* R. Bohart
Appressed pubescence of scutum brownish or brownish yellow.....
.....*californicus* R. Bohart and *spatulatus* Fox
4. Tergite V with appressed pubescence partly pale, at least laterally..... 5
Tergite V with appressed pubescence all dark..... 7
5. Pygidium bright golden to nearly silvery.....*sayi* Banks
Pygidium with a coppery reflection 6
6. Flagellomere II fully twice as long as broad; pygidium reflecting rather dark coppery.....*basirufus* Rohwer
Flagellomere II a little less than twice as long as broad; pygidium reflecting rather light, bright coppery.....*sculleni* R. Bohart
7. Ground color of abdomen all dark.....*pepticus sericatus* Cresson
Ground color of abdomen reddish on tergites I-II, at least..... 8
8. Pygidium silvery, yellowish apically; tergites I-II dull reddish.....
.....*cressoni* Banks
Pygidium with a coppery reflection; tergites I-II and base of III red.... 9
9. Occupying Indiana-Illinois area, associated with dark males.....
.....*pepticus pepticus* Say
Occupying a more southerly and westerly area; associated with red-marked males.....*pepticus chelatus* R. Bohart
.....and *fulviventrīs fulviventrīs* Cresson

TACHYTES PEPTICUS PEPTICUS (Say)

Lyrops pepticus Say, 1837. Boston Jour. Nat. Hist. 1:371. Syntypes, Indiana (destroyed); neotype ♂ (Banks, 1942:421), Lafayette, Indiana, AMNH.
Tachytes fulviventrīs inferioris Banks, 1942. Bull. Mus. Comp. Zool., Harvard 89:422. Holotype ♀, northern Illinois, MCZ.

Male.—As described for subspecies *chelatus* but facial pubescence usually yellower, and ground color of abdomen dark. Scutal bright pubescence sometimes more golden.

Female.—As described for subspecies *chelatus* but ground color of basal three abdominal segments usually dull red and sometimes restricted mostly to I and II.

Material examined.—One male, INDIANA: Lafayette (neotype male, and female paratype of *inferioris*); 8 females, ILLINOIS: Algonquin, "N. Ill.", Urbana.

The typical subspecies seems restricted to the Illinois-Indiana area, and is characterized by the dark male and reddish female.

Banks reported both sexes from Lafayette, Indiana, but he failed to associate them, presumably because of the sexual dimorphism.

***Tachytes pepticus chelatus* R. Bohart, new subspecies**

Male.—Length 12 mm. black, tarsi partly and abdominal segments I-II and most of III red, wings lightly stained. Pubescence of face, thorax, and apical bands on tergites I-IV as well as all of VI, off-silvery; bright pubescence of scutum and mesopleuron abundant, tinged with yellow. Median lobe of clypeus entirely punctate except for lip; flagellomere VIII broadened and with a fairly sharp distal edge, IX broader and sharply edged (fig. 5); sternite VII with a semicircular incision between almost pointed teeth (fig. 6); gonostyle long and slender, ventromedian tuft with many partly fulvous hairs and several distal bristles, volsella with a subbasal tuft of hairs on a prominence (fig. 7).

Female.—Length about 14 mm., basal three abdominal segments clear red. Appressed pubescence of tergite V all dark; pygidium with a rather bright coppery reflection.

Holotype male, WILLCOX, ARIZONA, August 14, 1958, (R. H. James). Paratypes, 13 males, July and August, all from ARIZONA: Pearce (Butler-Werner), Willcox (R. R. Dreisbach, R. M. Bohart, C. W. O'Brien), Hotevilla, Coconino Co. (Rehn, Pate, Rehn), Benson (P. H. Timberlake), Kayenta (S. Bee), near Douglas (H. A. Scullen), Dragoon (J. Bequaert). Metatypes, 1 male, 3 females, Zion National Park, Utah; Hotevilla, Arizona; near Prescott, Arizona; and 10 miles west of Gray Mt., Coconino Co., Arizona.

The extensively red abdomen of the male distinguishes this subspecies. From other red forms the male differs especially by the flagellum, punctate clypeus, and the diagnostic tufted subbasal prominence of the volsella. The extensive bright pubescence of the scutum, dark tergite V, and coppery pygidium distinguish the female from all except *fulviventris* which seems to occupy a different area. One weak structural difference seems to be that the clypeus of female *chelatus* is less polished above the lip.

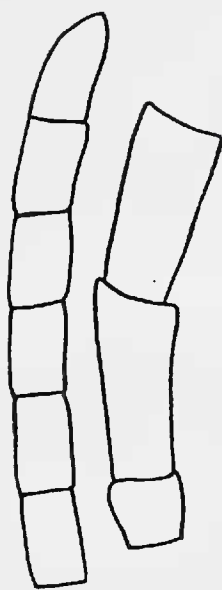
TACHYTES PEPTICUS SERICATUS Cresson

Tachytes sericatus Cresson, 1872. Trans. Amer. Ent. Soc. 4: 216. Lectotype ♀, Texas, ANSP.

Male.—As in the typical subspecies.

Female.—As in subspecies *chelatus* but ground color of abdomen dark.

Material examined.—50 males, 16 females from the following states: FLORIDA: Levy Co., Gainesville, Welaka, Miami, Cocoa, Myakka River State Park, Welaka, Sanford; GEORGIA: Darien, Tifton, Okefenokee Swamp, Spring Creek; NORTH CAROLINA: Southern Pines, New River; ALABAMA: Theodore; TEXAS: Bexar Co., Austin, Fedor, Conlen; KAN-

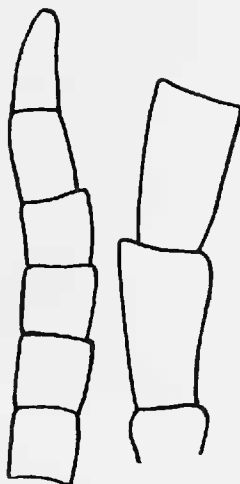


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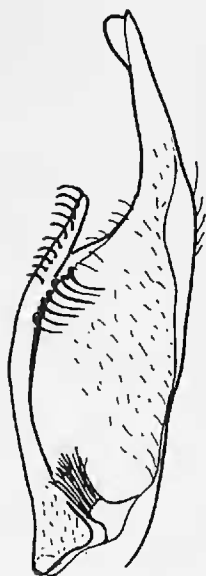
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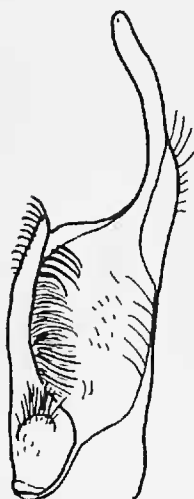
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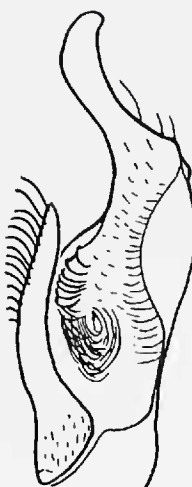
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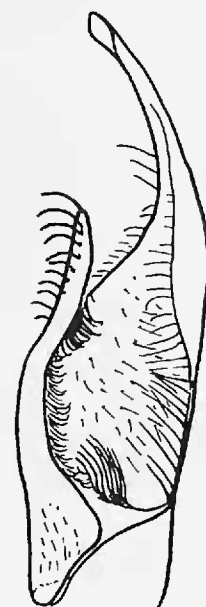
4. basirufus



7. chelatus



11. sculleni



14. spatulatus

EXPLANATION OF FIGURES

Figs. 1, 5, 8, 12, flagellomeres VI-XI of male in profile; figs. 2, 9, pedicel and flagellomeres I-II of female in profile view; figs. 3, 6, 10, 13, sternite VIII of male; figs. 4, 7, 11, 14, left volsella and gonostyle of male genitalia, ventral and slightly flattened view. Figs. 5-8, 10-11 are of holotypes.

SAS: Pottawatomie Co., Kearny Co., Stafford Co., Reno Co.; NEBRASKA: Sheridan Co.; COLORADO: Roggen, Wray, Julesburg.

This is the commonest and most widespread form of the species, and the only one with all-dark ground color in the female. Occasional females show a reddish tint at the apex of tergites I and II.

TACHYTES PENNSYLVANICUS Banks

Tachytes pennsylvanicus Banks, 1921. Ann. Ent. Soc. Amer. 14:18. Holotype ♂, Rockville, Pennsylvania, MCZ.

Male.—Body ground color dark. Pubescence of face and thorax fulvous. No median bright pubescence on scutum, none obvious on pleuron. Median lobe of clypeus a little polished above lip. Flagellomeres VII-VIII broadened and each with a sharp inner edge, IX also broadened but usually less so than VIII and often without a distinct sharp edge (fig. 24); sternite VII with less than a half-circle incision between stout teeth (fig. 25); gonostyle medium narrow, ventral tuft extending from stout distal setae through fulvous-tipped hairs to a basal setigerous ridge attached to sharp edge of gonobase (fig. 26).

Female.—Facial pubescence off-silvery, silvery tergal bands weaker than in other species of the group, appressed pubescence of tergite V dark reddish, pygidium with a dark bronze reflection.

Material examined.—111 males, 33 females from the following states: Virginia, New York, Tennessee, Illinois, Arkansas, Wisconsin, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Kansas (Manhattan), Colorado (Loveland, Burlington, Roggen), New Mexico (Albuquerque), Idaho (Tetonia, Teton Co.), Oregon (Corvallis), and British Columbia (Vernon).

The all-dark ground color of this species has led to a confusion with *pepticus* s.s. and *pepticus sericatus*. It was synonymized with *pepticus* by Banks (1942) even though he pointed out certain valid differences. In addition to the shape of the flagellum and eighth sternite of the male, the absence of median scutal, bright pubescence in both sexes of *pennsylvanicus* is sufficient for separation.

TACHYTES FULVIVENTRIS FULVIVENTRIS Cresson

Tachytes fulviventris Cresson, 1872. Proc. Ent. Soc. Phila. 4:466. Holotype ♀, Colorado, ANSP.

Tachytes caelebs Patton, 1879, Bull. U. S. Geol. Surv. 5:355. Holotype ♂, northwestern Kansas, location of type unknown.

Male.—Basal two abdominal segments red. Pubescence of face and thorax off-silvery to somewhat fulvous, scutum and mesopleuron with abundant bright pubescence. Median lobe of clypeus partly polished. Flagellomeres VII-IX broadened and each sharply edged; sternite VIII with a semicircular incision between narrowly rounded teeth; gonostyle moderately broad, similar to that of *californicus* but not so stout, ventral tuft fairly compact and uniform, its hairs distally creamy. Structural details about as in figs. 18-20.



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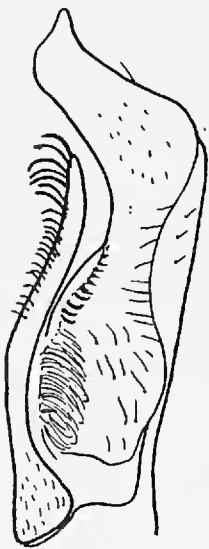
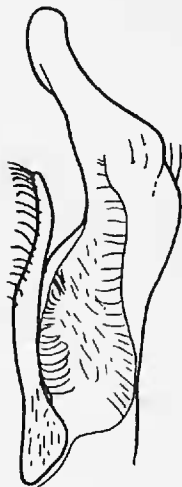
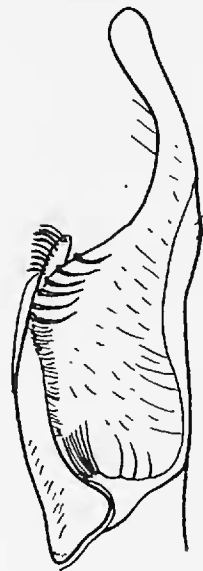
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17. *californicus*20. *rossi*23. *nevadensis*26. *pennsylvanicus*

EXPLANATION OF FIGURES

Figs. 15, 18, 21, 24, flagellomeres VI-XI of male in profile; figs. 16, 19, 22, 25, sternite VIII of male; figs. 17, 20, 23, 26, volsella and gonostyle of male genitalia, ventral and slightly flattened view. Figs. 15-17 are of a paratype from Antioch, California; figs. 18-23 are of holotypes.

Female.—Basal three abdominal segments red; facial pubescence and upright hair of thorax off-silvery; median bright pubescence of scutum off-silvery to coppery, extensive, that of mesopleuron conspicuous, off-silvery; appressed pubescence of tergite V all dark; pygidium with a bright coppery reflection.

Material examined.—100 males and 52 females from the following states: NEBRASKA: Harrison, Elm Creek; NORTH DAKOTA: Beach; KANSAS: Kearny Co., Grant Co., Pottawatomie Co., Meade Co., Stafford Co., Ford Co.; OKLAHOMA: Kansas Co., Cimarron; TEXAS: Stinnet, Conlen, Cornudas, Pecos, Marfa, Juno, Alpine, Sierra Blanca, Marathon, Van Horn; NEW MEXICO: Vaughn, Ramon, Magdalena, Dalhart, Sandia Mts., White Oaks, Whites City, Pyramid Peak, Alma, Pederal, Montoya, Clayton, Moriarty, Springer, Roswell, Carizosa; COLORADO: Wray, Boulder, Holly, Two Buttes, Lolita, Granada, Eads, Crook, Olney, Hotchkiss, Limon; UTAH: Erda, Tooele, W. Utah Lake, Park Valley, Junction, Kelton, Lincoln; WYOMING: Yellowstone National Park; CHIHUAHUA: Samalayuca; DURANGO: Nombre de Dios; OAXACA: Mitla.

The moderately broadened male gonostyle, the abundant scutal and pleural bright pubescence, and the three expanded and sharply edged male flagellomeres are characteristic. The female can be confused with the red forms of *pepticus*, in which, however, the clypeus is more evenly sculptured toward the lip. Also, the geographical ranges seem to be distinct.

Tachytes fulviventris rossi R. Bohart, new subspecies

Male.—As in typical *fulviventris* Cresson except that ground color of abdomen is all dark. Length 11 mm. Structural details shown in figs. 18-20.

Female.—Unknown.

Holotype male, 20 MILES N. MESQUITAL, BAJA, CALIFORNIA, September 27, 1941, (E. S. Ross, G. E. Bohart). Paratypes, 1 male, same data as holotype; 3 males, San Diego, California, August 23, 1891 (F. E. Blaisdell).

From the other dark males of the group, *pepticus* and *pennsylvanicus*, this form differs by its distinctive flagellum and genitalia. Also, the abundant scutal bright appressed pubescence separate it from *pennsylvanicus*, the shinier clypeus from *pepticus*.

Tachytes nevadensis R. Bohart, new species

Male.—Length 12 mm. Black, tarsi mostly and basal three abdominal segments red, wings very lightly stained. Pubescence of face and thorax silvery, thorax with pale appressed pubescence but not bright except for pretegular spot, apical bands on tergites I-IV silvery, VII slightly off-silvery. Median lobe of clypeus partly polished, no distinct boss; flagellomeres VII-IX slightly broadened, IX less so than VIII, none with a sharp inner edge (fig. 21); sternite VII with narrowly rounded teeth (fig. 21); gono-

style long and slender, ventral tuft with many hairs and setae as well as three curved distal spines (fig. 23).

Female.—Length about 16 mm. Abdominal segments I-III red; facial pubescence and erect hair of thorax silvery. Tergite V with appressed pubescence dark reddish, pygidium with a dull, dark coppery reflection.

Holotype male, 6 MILES SOUTH OF BEOWAWE, EUREKA CO., NEVADA, September 15, 1957, on *Chrysothamnus albidus* (R. C. Bechtel). Paratypes, 63 males, 15 females, June to September, NEVADA: near Beowawe (R. C. Bechtel), near Orovada (R. C. Bechtel), near Nixon (A. E. Menke), near Reno (R. C. Bechtel), Sparks (R. M. Bohart), near Winnemucca (F. D. Parker); CALIFORNIA: Deep Springs, Inyo Co. (W. McLellan, E. Schlinger, J. MacSwain, J. Brooks, R. Bohart); Antelope Springs, Inyo Co. (J. MacSwain, H. Court); Hallelujah Junction, Lassen Co. (P. Hurd, J. Gillaspay); Lake City, Modoc Co. (C. L. Fox). Also 21 metatype males from NEVADA: Elko Co., Yerington, Paradise City; UTAH: Ouray Valley, Miners Peak (Iron Co.), Duchesne, Flowwell, Paragonah, Washington, Willard Peak, Logan Canyon, Vernal, Gusher, Pahvant, Eureka; OREGON: Umatilla; WASHINGTON: Yakima River; CALIFORNIA: Big Pine Creek (Inyo Co.), Lee Flat (Inyo Co.).

The male of *nevadensis* is most easily confused with that of *sculleni* which has a similar flagellum. However, flagellomeres VII-IX are not creased in *nevadensis* and there is practically no median bright appressed pubescence. The stout curled spines of the ventral tuft of the gonobase are diagnostic. The female is very similar to those of *spatulatus* and *californicus* but differs from both by the silvery to light creamy color of the appressed scutal pubescence. Also, the facial pubescence of *nevadensis* is generally more silvery than in the other two species.

Tachytes californicus R. Bohart, new species

Male.—Length 11 mm. Black, most of tarsi and basal two abdominal segments red, wings lightly stained. Face off-silvery, scutum without bright pubescence in anteromedian area, erect hair greyish-white to pale fulvous; apical bands on tergites I-IV slightly off-silvery, VII silvery. Median lobe of clypeus partly polished, no distinct boss, flagellomeres VII-IX increasingly broadened, inner edge sharp (fig. 15); sternite VIII with rounded teeth (fig. 16); gonostyle unusually broad, strongly bent outward (fig. 17), ventral tuft with many hairs.

Female.—Length about 18 mm. Abdominal segments I-III red; facial

pubescence creamy, appressed pubescence of scutum brownish, tergite V with appressed pubescence black; pygidium evenly and densely covered with nearly black setae with a dull, dark coppery reflection.

Holotype male, DAVIS, YOLO CO., CALIFORNIA, July 16, 1955 (E. I. Schlinger). Paratypes, 110 males, May to September, all from CALIFORNIA: Artois, Auburn, Davis, Tesla (Alameda Co.), Antioch, Mt. Diablo, Vacaville, Menlo Park, San Antonio Valley (Santa Clara Co.), Friant, Watts Valley (Fresno Co.), Three Rivers, Caliente, Shafter, Foster Park (Ventura Co.), Cressey, near Cachuma Lake (Santa Barbara Co.), Riverside, near Warner Springs. Metatypes, 11 females, CALIFORNIA: Artois, Vacaville, Elk Grove, Orangegrove (Sacramento Co.), Green Valley (Solano Co.), Hospital Canyon (San Joaquin Co.), Friant, Los Angeles, Warner Springs, Santa Cruz Island. Also, males from Moscow, Parma, and Bliss, Idaho; and Jefferson Co., Oregon.

The male with its three broad and creased flagellomeres, absence of bright appressed pubescence medially on the scutum, and broad gonostyles is relatively easy to distinguish. However, the female is practically identical with that of *spatulatus*. Male-associated specimens of *californicus* seem to have the abdomen brighter and with more reflection from the appressed pubescence than male-associated specimens of *spatulatus*.

Tachytes sculleni R. Bohart, new species

Male.—Length 12 mm. Black, terminal tarsomeres and basal three abdominal segments red, wings practically clear. Face silvery, scutum and mesopleuron with considerable silvery bright pubescence; apical bands on tergites I-IV silvery, VII slightly off-silvery. Median lobe of clypeus partly polished, no distinct boss, flagellomeres VII-IX slightly broadened, IX less so than VIII, VIII-IX with sharp inner edge (fig. 8); sternite VIII with narrowly rounded teeth (fig. 10); gonostyle moderately broad (fig. 11), ventral tuft with many hairs and distal bristles.

Female.—Length about 15 mm. Facial pubescence and erect hair of thorax silvery; bright pubescence of scutum creamy, that of pleuron abundant and silvery; tergite V with some lateral creamy to fulvous appressed pubescence; pygidium with a rather bright coppery reflection. Flagellomere II about 1.6 times as long as broad (fig. 9).

Holotype male, WILLCOX, COCHISE CO., ARIZONA, August 20, 1958. (R. M. Bohart). Paratypes, 70 males, ARIZONA: Willcox (E. Linsley, P. Hurd, E. Ordway, A. Telford, R. Bohart), near Douglas (H. Scullen, E. Linsley, P. Hurd, E. Van Dyke), Tucson (R. Crandall, J. Martin, G. Butler), Phoenix (J. Gunder), Hotevilla, Coconino Co. (Rehn, Pate, Rehn), Apache (W. Jones);

NEW MEXICO: Rodeo (R. James, R. Rice, P. Marsh, D. Linsdale, R. Bohart), Lordsburg (H. Scullen, L. Stange, A. Menke), near Deming (H. Scullen); NEVADA: near Mesquite (R. Bechtel). Metatypes, 10 males, 18 females, CALIFORNIA: Olancho, Blythe, 29 Palms, Ivanpah; NEVADA: near Mesquite; ARIZONA: Douglas, Willcox, Toltec, Vail, Continental, Eloy, Tuba City, Pearce, Prescott, Elfrida, Sentinel; NEW MEXICO: Lisbon, Carlsbad, Ramon, Lordsburg, Rodeo, Mesilla Park; TEXAS: Marfa, Cornudas, El Paso.

The male of *sculleni* is distinguished by the flagellum, the moderately broad gonostyle, and the three red abdominal segments; the female by the silvery face, abundant scutal and pleural bright pubescence, creamy to fulvous lateral pubescence of tergite V, and the light coppery pygidium.

TACHYTES BASIRUFUS Rohwer

Tachytes basirufus Rohwer, 1909. Ent. News 20:197. Holotype ♂, Livermore, Larimer Co., Colorado, 7,000 ft.; supposedly in collection of "Colorado Agric. College" but apparently missing.

Male.—Basal two abdominal segments red. Pubescence of face and thorax silvery, or bright pubescence sometimes yellowish on scutum, a little silvery bright pubescence on mesopleuron; tergite VII usually yellowish. Median lobe of clypeus partly polished. Flagellomeres VIII-XI slightly flattened and broadened, XI about twice as long as broad, X with a fairly well defined inner edge (fig. 1); sternite VIII with a rounded incision between blunt apical teeth (fig. 3); gonostyle long and slender, ventral tuft divided into a reddish median group of about 10 setae and a basal mass of dark bristles (fig. 4).

Female.—Length about 15 mm. Abdominal segments I-III red. Facial pubescence and erect hair of thorax silvery to slightly grey, bright appressed pubescence of notum and tergites silvery, that of anteromedian scutal depression limited to 10-20 separated hairs; tergite V with some lateral creamy fulvous appressed pubescence; pygidium with a dark coppery reflection. Flagellomere II fully twice as long as broad (fig. 2).

Material examined.—17 males, June to August, UTAH: Bluff (C. T. Brues); ARIZONA: Grand Canyon South Rim (H. and M. Evans), 15 miles E. Cameron (C. O'Brien); NEVADA: Mt. Springs Summit, Clark Co. (F. D. Parker), Alamo (F. D. Parker), Hiko, Lincoln Co. (R. C. Bechtel); CALIFORNIA: near Idyllwild (E. Ross, A. Menke, L. Stange, P. Hurd); Antelope Springs, Inyo Co. (H. Court); Saline Valley, Inyo Co. (A. Menke, L. Stange); HIDALGO (Mexico): Zimapan (H. Evans). Also, 2 females (associated with 4 males), NEVADA: Mt. Springs Summit, Clark Co., July 31-August 2, 1959 (F. D. Parker).

The male genitalia readily separate this species from its more common relative, *spatulatus*. Also, the longer and more slender

last antennal segment of *basirufus* is a reliable criterion. I have not seen Rohwer's holotype male, but his original description points out the two red abdominal segments, the relatively simple flagellum, the rounded emargination of sternite VIII, and the yellowed tergite VII. The presumed female is close to *sculleni* but has the second flagellomere distinctly longer. The male has the flagellomeres proportionately longer than in other species of the group.

TACHYTES SPATULATUS Fox

Tachytes spatulatus Fox, 1892. Trans. Amer. Ent. Soc. 19:243. Holotype ♂, Nevada, ANSP.

Tachytes utahensis Banks, 1942. Bull. Mus. Comp. Zool., Harvard 89:424. Holotype ♀, Watson, Utah, MCZ. *New synonymy.*

Male.—Basal two abdominal segments red. Pubescence of face and thorax silvery, scutum and mesopleuron without bright pubescence except pre-tergular spot. Median lobe of clypeus partly polished. Flagellomeres IX-XI distinctly broader than VIII, XI about two-thirds as broad as long and somewhat flattened as well as inflated, IX and X with a fairly definite inner edge (fig. 12); sternite VIII with broadly rounded teeth (fig. 13); gonostyle slender, a long row of median to basal hairs which are mostly fulvous to creamy (fig. 14).

Female.—Agreeing with description of *californicus*. It differs in the lesser development of silvery and fulvous appressed pubescence on the three red tergites, and the scantier appressed brownish hair of the scutum.

Material examined.—152 males and 70 females. Localities, based on males only, are: WYOMING: Laramie, Yellowstone National Park; COLORADO: Glenwood Springs, Denver, Alamosa; NEW MEXICO: Las Vegas, Silver City, Santa Fe; UTAH: Provo, Eureka, Mollies Nipple, Cedar City, Salt City; IDAHO: Blackfoot, American Falls, Lewiston, Melba, Notus; OREGON: Juntura; NEVADA: Reno, Pilot Peak, Montello, Minden, Sparks, Fernley; ARIZONA: Prescott, Showlow, Snowflake, Tombstone, Oak Creek Canyon, Pinaleno Mts., Santa Catalina Mts., Graham Mts., Huachuca Mts., Baboquivari Mts., Pajarito Mts.; CALIFORNIA: Cassel, Lassen Creek, Hallelujah Junction, Geyserville, Auburn, Groveland, Yosemite Valley, Leevining, Topaz Lake, Sequoia National Park, Kings Canyon, Sonora, Upper Lake, Ione, Plymouth, Sacramento, Sespe Canyon, Yucaipa, Beaumont, Anza, Riverside, Whitewater, Big Bear Valley, Julian, Warner Springs. Other states reported have been North Dakota and Washington.

The inflated terminal flagellomeres of the male are diagnostic. The only species approaching it is *basirufus* in which the terminal flagellomere is about twice as long as broad. Since the differences in pubescence of the females of *spatulatus* and *californicus* involve a matter of degree, determination of male-associated specimens will be the most reliable criterion.

TACHYTES CRESSONI Banks

Tachytes cressoni Banks, 1942. Bull. Mus. Comp. Zool. Harvard 89:425.
Holotype ♀, Fedor, Lee Co., Texas, MCZ.

Known from three females only, collected at Fedor and Austin, Texas, *cressoni* is presumed to be in this group. Verification will depend on the discovery of males. The female characteristics are outlined in the key.

TACHYTES SAYI Banks

Tachytes sayi Banks, 1942. Bull. Mus. Comp. Zool., Harvard 89:421. Holotype ♂, Clear Creek, Colo., MCZ.

Tachytes hesperus Banks, 1942. Bull. Mus. Comp. Zool., Harvard 89:423.
Holotype ♀, Spokane, Wash., MCZ. *New Synonymy.*

Tachytes brevipilis Banks, 1942. Bull. Mus. Comp. Zool. 89:422. Holotype ♀, Lee Co., Texas, MCZ. *New Synonymy.*

The dark male and partly red female led to a wrong association of sexes by Banks and consequently to the above synonymy. Banks' females of "sayi" were *pennsylvanicus*, and his males of "hesperus" were *nevadensis*. Strictly speaking, *sayi* does not belong in this group since the male flagellum is simple. The females, which might be confused with those of *scullenii* are differentiated in the key. The known distribution includes the western states as far east as Iowa, Kansas, and Texas. I have seen specimens also from British Columbia (Vernon) and Baja, California (Ignacio and San Benito Island).

BOOK REVIEW

INSECT SOUNDS. By P. T. Haskell. Chicago: Quadrangle Books, Inc.
viii + 189 pp., 97 figs. November 1, 1961. \$5.75.

The literature on the subject of insect sounds is quite extensive, but until recently no synthesis has been available. Frings and Frings helped to correct the situation in their recent review (1958, Ann. Rev. Ent., 3:87-106), and the same authors provided the very useful "Sound production and sound reception by insects, a bibliography" (1960, Pennsylvania State University Press, ii + 108 pp.), which is made even more valuable by the inclusion of a taxonomic index, to the family level, and a subject index.

To these works may be added Haskell's book. This attractive volume serves both as a general introduction to the subject and as a manual for research. The first chapter discusses sound in general, sounds made by insects in particular, problems encountered in the recording and analysis of these sounds, and the equipment needed for research. The discussion is not especially technical, yet it provides enough information so that little knowledge of electronics is needed to make an intelligent selection of equipment.

The second chapter is on the mechanisms insects use to produce sounds.